Space Weather Forecast

Issued on Wednesday 25 September 2024 at 01:11 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Minor Geomagnetic Storm likely, mainly Day 1 (25 Sep). Chance of Moderate flares.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has been Low with only a Common-class flares observed in the past 24 hours.

There are currently nine sunspot regions on the visible disc, with a further new region developing in the southeast. The region on the southeast limb remains very difficult to assess due to its viewing angle, but appears to have some magnetic complexity developing, certainly one to watch. Also, some notable looping in imagery on the east limb. The remaining sunspot regions on the disc appear mostly small or simple.

A Coronal Mass Ejection (CME) was observed 22-23 Sep, directed primarily to the south and east, mostly away from Earth. However, analysis suggests a possible glancing blow on Day 1 (25 Sep). No other Earth-directed CMEs were observed.

Solar Wind / Geomagnetic Activity: The solar wind started the period at slightly elevated levels, near 490km/s, with a declining trend down to background levels, near 380km/s. Wind speeds have recently increased back to Slightly Elevated levels, currently near 440km/s. Interplanetary Magnetic Field was moderate to weak, increasing to the current moderate levels. The north-south component was moderately southward directed at the start of the period, then weakly northward until 24/0630 UTC, then became weak to moderate and mostly southward directed. Geomagnetic activity was mostly Quiet to Unsettled (Kp 1-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background levels.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate activity is expected, with a chance of isolated Moderate flares.

Solar Wind / Geomagnetic Activity: The CME following a flare off the southeast quadrant on 22 Sep may give a glancing blow at Earth on Day 1 (25 Sep) with effects potentially lasting into Day 2 (26 Sep). This may coincide with the arrival of a coronal hole fast wind. However, this aspect of the forecast carries low confidence. Solar winds are currently slightly elevated under the influence of

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what appears to be a weak HSS and are likely to remain at similar levels. If we experience a glancing blow from the above mentioned CME then wind speeds could potentially become elevated.

Geomagnetic activity is forecast to be Quiet to Unsettled. If we see a combination of fast winds and CME influence on Days 1-2 (25-26 Sep) then this will bring the likelihood of Active to G1/Minor Storm intervals. However, if we see more significant influence from the CME, then geomagnetic activity could become more significantly enhanced, with a slight chance of reaching G2-G3/Moderate-Strong Storm intervals. This is currently considered to be low confidence. Geomagnetic activity is likely to gradually ease to Quiet to Unsettled during Days 3 and 4 (27-28 Sep).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is likely to be at background levels with just a very slight chance of solar radiation storms occurring.

Geomagnetic Storms

Geomagnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	60	30	10	5
Strong	G3	No	20	10	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 (M Class)	No	40	40	40	40
Very Active	R3-R5 (X Class)	No	5	5	5	5

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	5	5	5	5
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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